

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (CURRENTLY AMENDED) A multi-piece solid golf ball comprising a solid core consisting of a center core and an outer core, an inner cover layer and an outer cover layer, wherein the solid core is molded from a rubber composition comprising

100 parts by weight of a base rubber composed of (a) 20 to 100 wt% of a polybutadiene having a cis-1,4 content of at least 60% and a 1,2 vinyl content of at most 2%, having a viscosity η at 25°C as a 5 wt% solution in toluene of up to 600 mPa·s, being synthesized using a rare-earth catalyst, in combination with (b) 0 to 80 wt% of a diene rubber other than component (a),

(c) 10 to 60 parts by weight of an unsaturated carboxylic acid or a metal salt thereof or both,

(d) 0.1 to 5 parts by weight of an organosulfur compound,

(e) 5 to 80 parts by weight of an inorganic filler, and

(f) 0.1 to 5 parts by weight of an organic peroxide;

the center core has a JIS-C hardness of 40 to 60 on its center and a JIS-C hardness of 55 to 75 on its surface and the difference therebetween is at least 10, the outer core is harder than the surface hardness of the center core, the cross-sectional hardness of 1 mm outside from the border between the center core and the outer core is from 65 to 85 on a JIS-C hardness, the surface of the outer core has a JIS-C hardness of 75 to 95,

the inner cover layer has a Shore D hardness of 50 to 80, the outer cover layer has a Shore D hardness of 35 to 60, and

the outer cover layer has a lower Shore D hardness than the inner cover layer.

2. (ORIGINAL) The golf ball of claim 1, wherein the polybutadiene (a) satisfies relationship: $10B + 5 \leq A \leq 10B + 60$, wherein A is the Mooney viscosity (ML_{1+4} (100°C)) of the polybutadiene and B is the ratio M_w/M_n between the weight-average molecular weight M_w and the number-average molecular weight M_n of the polybutadiene.

3. (ORIGINAL) The golf ball of claim 1, wherein the diene rubber (b) includes 30 to 100 wt% of a second polybutadiene which has a cis-1,4 content of at least 60% and a 1,2 vinyl content of at most 5%, has a Mooney viscosity (ML_{1+4} (100°C)) of not more than 55, and satisfies the relationship:

$$\eta \leq 20A - 550,$$

wherein A is the Mooney viscosity (ML_{1+4} (100°C)) of the second polybutadiene and η is the viscosity of the second polybutadiene, in mPa·s, at 25°C as a 5 wt% solution in toluene.

4. (ORIGINAL) The golf ball of claim 3, wherein the second polybutadiene in component (b) is synthesized using a Group VIII catalyst.

5. (ORIGINAL) The golf ball of claim 1, wherein the center core has a diameter of 15 to 36 mm and the outer core has a thickness of 1.5 to 10 mm, and the inner cover layer has a thickness of 0.2 to 3.0 mm and the outer cover layer has a thickness of 0.2 to 2.0 mm.

6. (NEW) The golf ball of claim 1, wherein the polybutadiene has a cis-1,4 content of at least 80% and a 1,2 vinyl content of at most 1.7%.

7. (NEW) The golf ball of claim 1, wherein the polybutadiene has a cis-1,4 content of at least 90% and a 1,2 vinyl content of at most 1.5%.

8. (NEW) The golf ball of claim 1, wherein the polybutadiene has a cis-1,4 content of at least 95% and a 1,2 vinyl content of at most 1.3%.

9. (NEW) The golf ball of claim 1, wherein the polybutadiene has a viscosity η at 25°C as a 5 wt% solution in toluene in the range of 50 to 550 mPa·s.

10. (NEW) The golf ball of claim 1, wherein the polybutadiene has a viscosity η at 25°C as a 5 wt% solution in toluene in the range of 100 to 500 mPa·s.

11. (NEW) The golf ball of claim 1, wherein the polybutadiene has a viscosity η at 25°C as a 5 wt% solution in toluene in the range of 150 to 450 mPa·s.

12. (NEW) The golf ball of claim 1, wherein the polybutadiene has a viscosity η at 25°C as a 5 wt% solution in toluene in the range of 200 to 400 mPa·s.

13. (NEW) The golf ball of claim 2, wherein A is at least $10B + 7$, but not more than $10B + 55$.

14. (NEW) The golf ball of claim 2, wherein A is at least $10B + 8$, but not more than $10B + 50$.

15. (NEW) The golf ball of claim 2, wherein A is at least $10B + 9$, but not more than $10B + 45$.

16. (NEW) The golf ball of claim 2, wherein the Mooney viscosity (ML_{1+4} (100°C)) of the polybutadiene is in the range of 20 to 80.

17. (NEW) The golf ball of claim 2, wherein the Mooney viscosity (ML_{1+4} (100°C)) of the polybutadiene is in the range of 30 to 70.

18. (NEW) The golf ball of claim 2, wherein the Mooney viscosity (ML_{1+4} (100°C)) of the polybutadiene is in the range of 40 to 65.

19. (NEW) The golf ball of claim 2, wherein the Mooney viscosity (ML_{1+4} (100°C)) of the polybutadiene is in the range of 50 to 60.
20. (NEW) The golf ball of claim 1, wherein the rare-earth catalyst is at least one rare-earth catalyst selected from the group consisting of a lanthanide series rare-earth compound, an organoaluminum compound, an alumoxane, and a halogen-bearing compound.
21. (NEW) The golf ball of claim 1, wherein the base rubber is composed of 25 to 90 wt% of said polybutadiene.
22. (NEW) The golf ball of claim 1, wherein the base rubber is composed of 30 to 80 wt% of said polybutadiene.
23. (NEW) The golf ball of claim 1, wherein the base rubber is composed of 35 to 70 wt% of said polybutadiene.
24. (NEW) The golf ball of claim 1, wherein the diene rubber is selected from the group consisting of polybutadiene rubber, styrene-butadiene rubber, natural rubber, polyisoprene rubber, ethylene-propylene-diene rubber, and mixtures thereof.

25. (NEW) The golf ball of claim 1, wherein the diene rubber is included in an amount in the range of 10 to 75%.
26. (NEW) The golf ball of claim 1, wherein the diene rubber is included in an amount in the range of 20 to 70%.
27. (NEW) The golf ball of claim 1, wherein the diene rubber is included in an amount in the range of 30 to 65%.
28. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a cis-1,4 content of at least 80% and a 1,2 vinyl content of at most 4.5%.
29. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a cis-1,4 content of at least 90% and a 1,2 vinyl content of at most 4.0%.
30. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a cis-1,4 content of at least 95% and a 1,2 vinyl content of at most 3.5%.
31. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a Mooney viscosity of at least 10.

32. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a Mooney viscosity in the range of 20 to 55.

33. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a Mooney viscosity in the range of 25 to 50.

34. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a Mooney viscosity in the range of 30 to 45.

35. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a viscosity in the range of 20A - 700 to 20A - 560.

36. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a viscosity in the range of 20A - 680 to 20A - 580.

37. (NEW) The golf ball of claim 3, wherein the second polybutadiene has a viscosity in the range of 20A - 650 to 20A - 590.

38. (NEW) The golf ball of claim 3, wherein the diene rubber includes 50 to 90 wt% of said second polybutadiene.

39. (NEW) The golf ball of claim 3, wherein the diene rubber includes 70 to 80 wt% of said second polybutadiene.
40. (NEW) The golf ball of claim 1, wherein there is 15 to 50 parts by weight of said unsaturated carboxylic acid or said metal salt thereof or both.
41. (NEW) The golf ball of claim 1, wherein there is 20 to 45 parts by weight of said unsaturated carboxylic acid or said metal salt thereof or both.
42. (NEW) The golf ball of claim 1, wherein there is no more than 40 parts by weight of said unsaturated carboxylic acid or said metal salt thereof or both.
43. (NEW) The golf ball of claim 1, wherein the organosulfur is included in the range of 0.2 to 4 parts by weight.
44. (NEW) The golf ball of claim 1, wherein the organosulfur is included in the range of 0.5 to 3 parts by weight.
45. (NEW) The golf ball of claim 1, wherein no more than 2 parts by weight of the organosulfur is included.

46. (NEW) The golf ball of claim 1, wherein the inorganic filler is included in an amount in the range of 7 to 50 parts by weight.

47. (NEW) The golf ball of claim 1, wherein the inorganic filler is included in an amount in the range of 10 to 45 parts by weight.

48. (NEW) The golf ball of claim 1, wherein the inorganic filler is included in an amount in the range of 13 to 40 parts by weight.

49. (NEW) The golf ball of claim 1, wherein the organic peroxide is included in an amount in the range of 0.3 to 4 parts by weight.

50. (NEW) The golf ball of claim 1, wherein the organic peroxide is included in an amount in the range of 0.5 to 3 parts by weight.

51. (NEW) The golf ball of claim 1, wherein the organic peroxide is included in an amount in the range of 0.7 to 2 parts by weight.

52. (NEW) The golf ball of claim 1, wherein said rubber composition further includes an antioxidant.

53. (NEW) The golf ball of claim 51, wherein said antioxidant is included in an amount in the range of 0.05 to 3 parts by weight per 100 parts by weight of said base rubber.

54. (NEW) The golf ball of claim 1, wherein a center hardness of said center core is in the range of 42 to 58 on the Shore D hardness scale.

55. (NEW) The golf ball of claim 1, wherein a center hardness of said center core is in the range of 44 to 56 on the Shore D hardness scale.

56. (NEW) The golf ball of claim 1, wherein a center hardness of said center core is in the range of 46 to 54 on the Shore D hardness scale.

57. (NEW) The golf ball of claim 1, wherein a surface hardness of said center core is in the range of 55 to 69 on the Shore D hardness scale.

58. (NEW) The golf ball of claim 1, wherein a surface hardness of said center core is in the range of 57 to 73 on the Shore D hardness scale.

59. (NEW) The golf ball of claim 1, wherein a surface hardness of said center core is in the range of 59 to 71 on the Shore D hardness scale.

60. (NEW) The golf ball of claim 1, wherein a surface hardness of said center core is in the range of 61 to 69 on the Shore D hardness scale.

61. (NEW) The golf ball of claim 1, wherein a difference in Shore D hardness between a center hardness of said center core and a surface hardness of said center core is at least 15.

62. (NEW) The golf ball of claim 1, wherein a difference in Shore D hardness between a center hardness of said center core and a surface hardness of said center core is in the range of 12 to 25.

63. (NEW) The golf ball of claim 1, wherein a difference in Shore D hardness between a center hardness of said center core and a surface hardness of said center core is in the range of 13 to 23.

64. (NEW) The golf ball of claim 1, wherein a difference in Shore D hardness between a center hardness of said center core and a surface hardness of said center core is in the range of 15 to 20.

65. (NEW) The golf ball of claim 1, wherein the outer core has a thickness in the range of 1.5 to 10 mm.

66. (NEW) The golf ball of claim 1, wherein the outer core has a thickness in the range of 2 to 9 mm.
67. (NEW) The golf ball of claim 1, wherein the outer core has a thickness in the range of 2.5 to 8 mm.
68. (NEW) The golf ball of claim 1, wherein the outer core has a thickness in the range of 3 to 7 mm.
69. (NEW) The golf ball of claim 1, wherein the difference in hardness between the surface of the center core and the outer core is in the range of 2 to 30.
70. (NEW) The golf ball of claim 1, wherein the difference in hardness between the surface of the center core and the outer core is in the range of 3 to 20.
71. (NEW) The golf ball of claim 1, wherein the difference in hardness between the surface of the center core and the outer core is in the range of 4 to 15.
72. (NEW) The golf ball of claim 1, wherein the hardness of the surface of the outer core is in the range of 77 to 93 Shore D.

73. (NEW) The golf ball of claim 1, wherein the hardness of the surface of the outer core is in the range of 79 to 91 Shore D.

74. (NEW) The golf ball of claim 1, wherein the hardness of the surface of the outer core is in the range of 81 to 89 Shore D.

75. (NEW) The golf ball of claim 1, wherein the cross-sectional hardness of 1 mm outside from the border between the center core and the outer core is in the range of 68 to 83 Shore D.

76. (NEW) The golf ball of claim 1, wherein the cross-sectional hardness of 1 mm outside from the border between the center core and the outer core is in the range of 71 to 80 Shore D.

77. (NEW) The golf ball of claim 1, wherein the cross-sectional hardness of 1 mm outside from the border between the center core and the outer core is in the range of 74 to 77 Shore D.

78. (NEW) The golf ball of claim 1, wherein the inner cover layer has a Shore D hardness in the range of 51 to 75.

79. (NEW) The golf ball of claim 1, wherein the inner cover layer has a Shore D hardness in the range of 52 to 70.

80. (NEW) The golf ball of claim 1, wherein the inner cover layer has a Shore D hardness in the range of 53 to 65.

81. (NEW) The golf ball of claim 1, wherein the outer cover layer has a Shore D hardness in the range of 40 to 58.

82. (NEW) The golf ball of claim 1, wherein the outer cover layer has a Shore D hardness in the range of 45 to 56.

83. (NEW) The golf ball of claim 1, wherein the outer cover layer has a Shore D hardness in the range of 48 to 54.

84. (NEW) The golf ball of claim 1, wherein the difference in Shore D hardness between said inner cover layer and said outer cover layer is at least 2.

85. (NEW) The golf ball of claim 1, wherein the difference in Shore D hardness between said inner cover layer and said outer cover layer is in the range of 5 to 30.

86. (NEW) The golf ball of claim 1, wherein the difference in Shore D hardness between said inner cover layer and said outer cover layer is in the range of 7 to 25.

87. (NEW) The golf ball of claim 1, wherein the difference in Shore D hardness between said inner cover layer and said outer cover layer is in the range of 9 to 20.

88. (NEW) The golf ball of claim 1, wherein the inner cover layer has a thickness of 0.2 to 3.0 mm.

89. (NEW) The golf ball of claim 1, wherein the outer cover layer has a thickness of 0.2 to 2.0 mm.

90. (NEW) A multi-piece solid golf ball comprising a solid core consisting of a center core and an outer core, an inner cover layer and an outer cover layer, wherein the solid core is molded from a rubber composition comprising

100 parts by weight of a base rubber composed of (a) 35 to 70 wt% of a polybutadiene having a cis-1,4 content of at least 95% and a 1,2 vinyl content of at most 1.3%, having a viscosity η at 25°C as a 5 wt% solution in toluene of up to 400 mPa·s, being synthesized using a rare-earth catalyst, in combination with (b) 30 to 65 wt% of a diene rubber other than component (a),

(c) 10 to 60 parts by weight of an unsaturated carboxylic acid or a metal salt thereof or both,

(d) 0.1 to 5 parts by weight of an organosulfur compound,

(e) 5 to 80 parts by weight of an inorganic filler, and

(f) 0.1 to 5 parts by weight of an organic peroxide;

the center core has a Shore D hardness of 40 to 60 on its center and a Shore D hardness of 55 to 75 on its surface and the difference therebetween is in the range of 10 to 20, the outer core is harder than the surface hardness of the center core, the cross-sectional hardness of 1 mm outside from the border between the center core and the outer core is from 65 to 85 on a Shore D hardness, a surface of the outer core has a Shore D of 75 to 95,

the inner cover layer has a Shore D hardness of 50 to 80, the outer cover layer has a Shore D hardness of 35 to 60, and

the outer cover layer has a lower Shore D hardness than the inner cover layer,

wherein the polybutadiene (a) satisfies relationship: $10B + 5 \leq A \leq 10B + 60$, wherein A is the Mooney viscosity (ML_{1+4} (100°C)) of the polybutadiene and B is the ratio M_w/M_n between the weight-average molecular weight M_w and the number-average molecular weight M_n of the polybutadiene, and

wherein the diene rubber (b) includes 30 to 100 wt% of a second polybutadiene which has a cis-1,4 content of at least 60% and a 1,2 vinyl content of at most 5%, has a Mooney viscosity (ML_{1+4} (100°C)) of not more than 55, and satisfies the relationship:

$$\eta \leq 20A - 550,$$

wherein A is the Mooney viscosity (ML_{1+4} (100°C)) of the second polybutadiene and η is the viscosity of the second polybutadiene, in mPa·s, at 25°C as a 5 wt% solution in toluene.

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AMENDMENTS TO THE DRAWINGS

Figure 1 has been added to the application.